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CLAIMS:

1.   A device (1) for acoustic feedback compensation, the device comprising:
            - an adaptive filter (4) for providing an acoustic feedback compensation signal,
            - a first combination unit (3) for combining the acoustic feedback
compensation signal with an input signal so as to produce a residual signal,
            - a noise unit (8) for producing a noise signal,
            - an adjustment unit (5) for adjusting coefficients of the adaptive filter, and
            - a second combination unit (7) for combining the residual signal and the noise
signal so as to form an output signal,
wherein the noise unit (8) is arranged for providing a noise signal having a frequency
spectrum (R_N) controlled by the residual signal.

2.   The device according to claim 1, wherein the noise unit (8) is arranged for
providing a noise signal in accordance with an auditory masking model.

3.   The device according to claim 1 or 2, wherein the noise unit (8) is arranged for
providing a noise signal having a smaller amplitude than the residual signal at frequencies
where the residual signal has a relatively large amplitude and having a larger amplitude than
the residual signal at least at some frequencies where the residual signal has a relatively small
amplitude.

4.   The device according to claim 1, 2 or 3, wherein the noise unit (8) is arranged
for repeatedly adapting the frequency spectrum of the noise signal to the residual signal.

5.   The device according to claim 4, wherein the noise unit (8) is arranged for
adapting the frequency spectrum of the noise signal at intervals of less than 100 ms,
preferable less than 30 ms, more preferably about 15 ms.

6.   The device according to any of the preceding claims, wherein the noise unit
(8) comprises a random phase unit (84) for producing a random phase.

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7.   The device according to claim 6, wherein the noise masking unit (8) comprises a spectrum unit (81) for producing a frequency spectrum of the residual signal, a magnitude unit (82) for determining the magnitude of the frequency spectrum, a noise magnitude unit (83) for determining the magnitude of masked noise relative to the magnitude of the frequency spectrum, and a reconstruction unit (85) for reconstructing a masked noise signal on the basis of the magnitude of masked noise and the random phase.

8.   The device according to any of the preceding claims, wherein the adjustment unit (5) is coupled to the first combination unit (3) and the noise unit (8) so as to adjust coefficients of the adaptive filter on the basis of the residual signal and the noise signal.

9.   The device according to claim 8, wherein the adjustment unit (5) is arranged for a constant mis-adaptation of the adaptive filter so as to achieve a high adaptation speed.

10.   The device according to any of the preceding claims, further comprising an amplification unit (11).

11.   The device according to any of the preceding claims, further comprising a dynamic echo suppressor (14) arranged for suppressing echoes in the residual signal.

12.   The device according to claim 11, wherein the dynamic echo suppressor (14) is arranged for receiving the acoustic feedback compensation signal, the input signal and the residual signal so as to produce an echo suppressed residual signal.

13.   A system for sound amplification, comprising at least one microphone (2), at least one loudspeaker (9) and a device (1) according to any of claims 1 – 12.

14.   A method of acoustic feedback compensation, the method comprising the steps of:
          - combining an input signal with an acoustic feedback compensation signal so as to produce a residual signal,
          - producing a noise signal,

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- combining the residual signal and the noise signal so as to form an output signal, and

- adaptively filtering the output signal to provide the acoustic feedback compensation signal,

wherein the noise signal has a frequency spectrum controlled by the residual signal.

15.   The method according to claim 14, wherein the noise signal is provided in accordance with an auditory masking model.

16.   The method according to claim 14 or 15, wherein the noise signal has a smaller amplitude than the residual signal at frequencies where the residual signal has a relatively large amplitude and a larger amplitude than the residual signal at least at some frequencies where the residual signal has a relatively small amplitude.

17.   The method according to claim 14, 15 or 16, wherein the frequency spectrum of the noise signal is repeatedly adapted to the residual signal.

18.   The method according to any of claims 14 to 17, wherein the frequency spectrum of the noise signal is adapted at intervals of less than 100 ms, preferable less than 30 ms, more preferably about 15 ms.

19.   The method according to any of claims 14 to 18, wherein the noise signal has a random phase.

20.   A computer program product for carrying out the method according to any of claims 14 – 19.